INVESTIGATION OF THE AXIAL LOAD TRANSFER MECHANISM WITHIN CAST-IN-STEEL-SHELL PILES

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In this experiment, the axial load transfer within in Cast-In-Steel-Shell (CISS) Piles through surface bond, and mechanical axial load transfer mechanisms fixed to the steel shell interior was investigated. Twenty-one CISS pile test units were subjected to a quasi-static reversed cyclic axial loading, with typical diameters of 610 mm, and diameter to thickness (D/t) ratios ranging from 24 to 128. Six mechanical axial load transfer mechanisms were studied, which included a: shear ring, welded bar, weld bead, shear studs, cross bar, and tread plate. Other parameters studied in this experiment included the effects of: shear ring spacing, D/t ratio, expansive concrete, and surface condition.

All axial load transfer mechanisms exhibited a noticeable increase in the axial load capacity, in compression and tension. Test units with a mechanism circumferentially welded to the steel shell (i.e. shear ring) had the best performance. Such mechanisms were effective to the extent that the confinement pressure, provided by the steel shell for test units with a high D/t ratio (128 and 96) was exceeded. This resulted in a circumferential out-of-plane deformation (yielding) of the steel shell at the shear ring location, which limited the axial load transfer capacity. Test units with a higher confinement pressure (D/t ratio of 24) increased in axial force transfer through all simulated displacements, and resulted in a crushing failure of concrete at the mechanism location. Results from this experiment and ongoing research will be presented.

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